

WHAT IS CLAIMED IS:

- Sub A2* 1. A method for producing a silicon nitride filter, which comprises heat-treating in nitrogen a green body comprising from 35 to 90 mass% of silicon nitride particles having an average particle diameter of from 1 to 30 $\mu$ m, from 5 to 60 mass% of a pore-forming agent and from 0.1 to 5 mass% of metal oxide particles, provided that the total amount of the silicon nitride particles, the pore-forming agent and the metal oxide particles is at least 90 mass%, to form a porous product made substantially of silicon nitride.
2. The method for producing a silicon nitride filter according to Claim 1, wherein the metal oxide particles contain, as the main component, an oxide of at least one metal selected from the group consisting of Al, Ca, Sr, Ba, Y, Mg and Yb.
3. The method for producing a silicon nitride filter according to Claim 1, wherein the pore-forming agent is spherical organic polymer particles.
4. The method for producing a silicon nitride filter according to Claim 1, wherein the porosity of the filter is from 30 to 80%.
5. The method for producing a silicon nitride filter according to Claim 1, wherein the average pore diameter as measured by a mercury immersion method of the filter is from 5 to 20  $\mu$ m.
6. The method for producing a silicon nitride filter

according to Claim 1, wherein the heat-treating conditions are such that the green body is maintained in a nitrogen atmosphere at a temperature within a range of from 1,450 to 1,800°C for from 1 to 12 hours to carry out  
5 the heat treatment.

7. The method for producing a silicon nitride filter according to Claim 1, wherein the pore-forming agent is metal oxide hollow particles.

8. The method for producing a silicon nitride filter  
10 according to Claim 1, wherein the pore-forming agent is metal oxide hollow particles, and the metal oxide particles are metal oxide solid particles.

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9. A method for producing a silicon nitride filter, which comprises heat-treating in nitrogen a green body  
15 comprising from 45 to 85 mass% of silicon nitride particles having an average particle diameter of from 1 to 30µm, from 10 to 50 mass% of metal oxide hollow particles and from 0.1 to 5 mass% of metal oxide solid particles, provided that the total amount of the silicon  
20 nitride particles, the metal oxide hollow particles and the metal oxide solid particles is at least 90 mass%, to form a porous product made substantially of silicon nitride.

10. The method for producing a silicon nitride filter  
25 according to Claim 9, wherein the metal oxide solid particles contain, as the main component, an oxide of at least one metal selected from the group consisting of Al,

Ca, Sr, Ba, Y, Mg and Yb.

11. The method for producing a silicon nitride filter according to Claim 9, wherein the average particle diameter of the metal oxide hollow particles is from 30 to 200  $\mu\text{m}$ .

12. The method for producing a silicon nitride filter according to Claim 9, wherein the metal oxide hollow particles contain, as the main component, an oxide of Al and/or Si.

13. The method for producing a silicon nitride filter according to Claim 9, wherein the porosity of the porous product is from 30 to 80%.

14. The method for producing a silicon nitride filter according to Claim 9, wherein the average pore diameter as measured by a mercury immersion method of the porous product is from 5 to 40  $\mu\text{m}$ .

15. The method for producing a silicon nitride filter according to Claim 9, wherein the heat-treating conditions are such that the green body is maintained in a nitrogen atmosphere at a temperature within a range of from 1,600 to 1,800°C for from 1 to 12 hours to carry out the heat treatment.